

**International Center for Public Policy**  
**Working Paper 13-03**  
**February 2013**

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International Center for Public Policy  
Andrew Young School of Policy Studies  
Georgia State University  
Atlanta, Georgia 30303  
United States of America

Phone: (404) 651-1144  
Fax: (404) 651-4449  
Email: [hseraphin@gsu.edu](mailto:hseraphin@gsu.edu)  
Internet: <http://aysps.gsu.edu/isp/index.html>

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# ***A Behavioral Local Public Finance Perspective on the Renter's Illusion Hypothesis***

**Roberto Dell'Anno**

*Department of Economics and Statistics, University of Salerno, Via Ponte don Melillo*

**Jorge Martinez-Vazquez**

*Andrew Young School of Policy Studies, Georgia State University*

## **Abstract**

In this paper we argue that renter's illusion may not be a form of asymmetric information neither irrationality but rather a way to include in our economic analysis evidence that while *homo oeconomicus* aims to *do a good job of making choices*, he frequently is not able to do that. Taxpayers do not know the "objective" world but take decisions according to mental and often biased representations of "their" world. We develop a simple model where misperception plays a fundamental role in the behavior of renters and allows overcoming the dichotomy between rational and irrational renter's behavior. In the paper we also pursue the two complementary aims of introducing "cognitive limitation" into the theory of local public finance and of filling a gap in this literature regarding the lack of micro-foundations for the renter's illusion hypothesis.

**JEL:** H20, H71, H72, H77

**Keywords:** Renter effect; Renter's illusion; Fiscal illusion; Behavioral local public finance.

**Acknowledgment:** The paper was partly written when the first author was visiting at the Andrew Young School of Policy Studies at Georgia State University. The hospitality of this Institution is gratefully acknowledged.

## **1. Introduction**

The renter effect – also known as the renter’s illusion – hypothesis holds that renters are more likely to support local public expenditures than homeowners. This effect is magnified when expenditures are financed with property taxes as opposed to other forms of financing (Oates, 1988). As local governments in the United States and other countries collect a larger part of their revenue by this type of taxes, the renter effect is an important area of research in the public finance literature. While there is abundant evidence confirming the renter effect as an empirical fact, the debate on the nature of this issue is still unsettled.

Two alternative approaches are followed in the literature to explain this phenomenon. The first follows Buchanan’s (1967) approach to fiscal illusion. Renters, as opposed to homeowners, pay their property taxes in a hidden way as an unspecified part of their rental payment.<sup>1</sup> Thus, the renter effect is a consequence of the tenant’s cognitive limitation (illusion) of the actual tax-price of local public services.

The second explanation interprets the renter effect as a rational behavior of tenants. Renters demand more public services because they receive larger net benefits (value of local services versus taxes actually paid) by comparison to homeowners. These benefits are different as a consequence of agents’ heterogeneity (e.g. endowments).

A large literature addresses the renter effect in this dualistic perspective aiming to answer the issue of whether the renter effect is an irrational form or instead a rational form of behavior.

To take part in this debate we should carefully define what these concepts really mean and, in particular, explain why behavior under fiscal illusion may or may not be an irrational form of decision-making. A full discussion of these subjects is beyond the scope of this paper but, at least two arguments need to be explained.<sup>2</sup>

Two alternative interpretations exist about the rationality behind fiscal illusion. First, fiscal illusion is just a manifestation of information asymmetry and therefore it should be considered rational behavior. In the context of this paper, we will argue that renters may have different information sets than homeowners. In particular, renters may perceive a lower tax-price for the public provision of services so they demand higher quantities of public services. Second, fiscal illusion is a deviation from rationality because taxpayers suffer of biased misperceptions in one single direction. This implies that renters elicit inconsistent preferences in a systematic way. This second approach seems to be more elusive and it introduces another question in the debate. What

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<sup>1</sup> See Carroll and Yinger (1994), Zodrow (2001, 2006) for an overview of the tax shifting of property taxes.

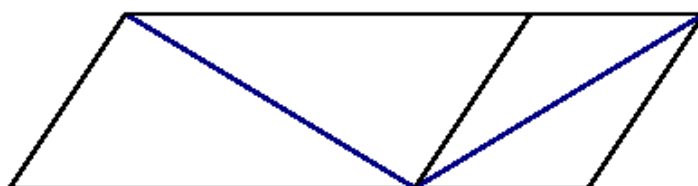
<sup>2</sup> For a general look at rationality in economics see, for example, McFadden (1999). For an overview of rationality behind fiscal illusion see Dell’Anno and De Rosa (2013).

does rationality really mean? Defining economic rationality is not an easy task. Following Thaler and Sunstein (2003: 176), we could accept as reasonable that a rational agent does *"a good job of making choices, or at least that he does a far better job than third parties could do"*. If this is the case, Thaler and Sunstein (2003) claim that there is little empirical support to state that individuals are rational. Over the past forty years there has been an impressive accumulation of behavioral evidence of cognitive anomalies (e.g. people do not exhibit rational expectations, use heuristics that lead them to make systematic blunders, make different choices depending on the wording of the problem, value present consumption much more than future consumption, and so on). In this sense, to ask the question of whether a renter is rational or irrational leads us to open the door to an interesting and everlasting debate between the different views of the decision-making process developed by Neoclassical and behavioral economists.

To gain a perspective on this research, we propose a query to the reader that is a metaphor of our point of view on the question of the relevance of fiscal illusion and therefore also of the renter effect.

Let us assume that you are in A and that your aim is to arrive in B or C, indifferently, at the lowest travel cost. There is a proportional toll that depends on the distance traveled. Your informative set is the road map in Figure 1. Where do you choose to go, in B or C?

**Figure 1:** Driver's road map



We turned right by choosing route  $\beta$ . If you have done the same, you, also like us, have suffered from an optical illusion (and also fiscal illusion) as the distances to B and C are actually exactly identical. Would you state that we have been irrational? Could anyone claim that this is due to an information asymmetry? Is the question or the map more complex than the decisions in the real world concerning taxes and public services? Does defining our behavior as irrational (by an economic viewpoint) reduce our misperception? (Even after we know that the routes  $\alpha$  and  $\beta$  have the same length, they continue to look different).

Both choices of either B or C yield the same net benefits, but some of us show a biased behavior consequence of a misperception. This example was just to say that investigating whether fiscal illusion (e.g. the renter effect) is consistent with a neoclassical idea of rationality can be a puzzling question, sometimes tautological, and frequently even an inconsequential issue. Out of the metaphor, people take decisions according to their perceptions of the “real” world. Thus fiscal illusion may not be a form of asymmetric information neither irrationality but rather a way to include in our economic analysis evidence that while *homo oeconomicus* aims to *do a good job of making choices*, he frequently is not able to do that. Taxpayers do not know the “objective” world but take decisions according to mental and often biased representations of “their” world.

Faced with this premise what is that this paper aims to do? In our metaphor, a cognitive illusion affected the demand for public goods (leading to the inefficient delivery of services: congestion of route  $\beta$ ). At the same time, we assume that rational renters are affected by a perceptive illusion, due to the misperception of the effective size of the tax shifting of property taxes.

This study proposes a simple model where misperception plays a role in behavior of renters. It attempts to overcome the dichotomy between rational and irrational taxpayer's behavior to explain the renter effect as a function of the level of misperception. We pursue two complementary aims. First, we introduce cognitive limitation into a local public finance, issue that continues to be controversial. Second, we aim to fill a gap in this literature regarding the lack of micro-foundations for the renter's illusion hypothesis (Blom-Hansen 2005).

The article is divided into five sections. Following this introduction, the second section reviews the empirical literature on the renter effect. The third section provides a simple static framework to explain at a micro level the behavior of renters and owners and the emergence of the renter effect. The fourth section approaches the issue from a public policy perspective. The five section draws some conclusions.

## **2. Literature review on the empirical analysis of the renter effect**

There is an enormous normative literature on the role of the renter effect in local public finance. Much attention has been paid to looking for whether the rational or the irrational (fiscal illusion) approaches to the renter effect is more consistent with the empirical evidence. Martinez-Vazquez (1983: 244) questions “*the predominance, if not the validity, of the fiscal illusion hypothesis in explaining renters' behavior*”. Blom-Hansen (2005) distinguishes between fiscal ignorance (unbiased misperception) and fiscal illusion (biased misperception) of tax property burden. He finds that renters (and homeowners, too) usually misperceive property tax burdens (i.e. fiscal



ignorance). However, compared to homeowners, renters do not systematically underestimate the land tax rate (biased misperception, i.e. fiscal illusion). Blom-Hansen (2005) concludes that the renter effect is a rational behavior affected by fiscal ignorance but not an illusion. Alternative explanations of renter effect also exist. Martinez-Vazquez and Sjoquist (1988), Epple and Romer (1991) and Banzhaf and Oates (2012) refer to the capitalization of property taxes into house and land values. These authors sustain that an excessive level of public spending gets (negatively) capitalized into house prices which translates into lower rents. Thus, the renter effect can be seen as a selfish behavior, since the burden actually may indeed fall on property owners rather than renters. Similarly, Carroll and Yinger (1994) find that renters are rational to favor more expansions in the local public budget than are landlords as property taxes are, to a substantial extent, not shifted forward onto renters (Oates, 2005). Therefore, the rational explanation of the renter effect may arguably be taken as the prevalent wisdom.

From an empirical perspective, the renter effect is largely confirmed by the data. Following Blom-Hansen (2005), two approaches have been proposed in the literature. First, there is a number of studies exploring the correlation between the proportion of renters and the aggregate spending (or tax revenues) in the jurisdiction. A second strand of the empirical literature explores renters' preference for public goods as revealed by referenda. The papers using the first approach usually find that, *ceteris paribus*, a larger presence or share of renters is significantly correlated with higher levels of local public expenditure or tax levels. Oates (2005) calculates on the basis of several estimates of the renter effect for the U.S. that if all residents were homeowners, local public budgets would typically shrink by around ten percent. The second strand of the literature basically confirms renters' desire or support for more public services relative to homeowners when they are called to elicit their preferences in a referendum. Table 1 summarizes the relevant literature using this classification.

**Table 2.** Survey of studies on the renter effect

Author	Data	Dependent var.	Renter effect?
<b>1<sup>st</sup> Approach</b>			
Barr and Davis (1966)	64 county governments of Pennsylvania	Expenditure per capita	Yes
Bergstrom and Goodman (1973)	826 municipalities located in 10 US states	Expenditure	Yes
Lovell (1978)	136 Connecticut towns	School expenditure	Yes
Lovell (1978)	CT school districts	Expenditure per pupil	Yes
Gronberg (1979)	83 Chicago suburbs	Total municipal expenditure	Yes
Beck (1984)	219 California municipalities	General municipal expenditure	Yes
Brazer and McCarty (1987)	600 school districts in Connecticut, New Jersey and Virginia	School and general expenditure	Yes
Schwab and Zampelli (1987)	73 US cities and counties	Police expenditure	Yes
Deno and Mehay (1987)	US municipalities	Different types of Total Expenditure 1	Yes
Santerre (1989)	CY a) school District b) municipalities	a) Expenditure per pupil b) Municipal expenditure	Yes
Megna and Lee (1990)	Wisconsin sch. district	Expenditure per pupil	Yes
Bogart (1991)	New Jersey municipalities	Public Works Exp	Yes
Gonzale, Means, and Mehat (1993)	California municipalities	Police Expenditure	Yes
Dollery and Worthington (1999)	46 local governments in Tasmania, Australia	General expenditure Proportion of homes owned	Yes
Gemmell et al. (2002)	54 English and Welsh counties	General expenditure	No
<b>Both approaches</b>			
Blom-Hansen (2005)	a) Survey data Danish renters' and home-owners'. b) 272 Danish municipalities	a) perception of the land tax system b) Land tax rate; Land tax revenue; Tax structure	No
<b>2<sup>nd</sup> Approach</b>			
Hanushek (1975)	Two referenda on expenditure increases in Cleveland	Probability of voting for expenditure increase	Yes
Peterson (1975)	Household voting for tax and Expenditure proposals in US school districts	Desired level of school spending	Yes
Levy (1979)	California	Votes for expenditure cuts	Yes
Martinez-Vazquez (1983)	Referendum on expenditure increases in St Louis	Percentage 'yes' votes	Yes
Schokkaert (1987)	Survey data from a sample of 2404 inhabitants in Puurs, Belgium	Demand for public spending	No
Moomau and Morton (1992)	Referendum to increase property taxation in New Orleans	Probability of a 'yes' vote	Yes
Banzhaf and Oates (2012)	open space referenda in the U.S.	Log-odds of Voter Approval of Referenda	No

### 3. A simple Model of Fiscal Illusions in Local Government

In this section, we present an analytical framework to explain the emergence of the renter effect as a special case of a rational taxpayer affected by a fiscal illusion, or alternatively, the model allows us to consider the rational taxpayer (no- renter effect and no fiscal illusion) as a special

case of a wider set of behaviors. The model aims to explain the difference between renters and homeowner's preferences in the demand for public services. We will assume that local governments provide public services (Samuelson, 1954).

Local governments finance the public provision of services by levying two types of taxes: a tax on (housing) property ( $t_p$ ) and fees for services ( $t_s$ ). Consequently, it is assumed that local governments split, in a not necessarily transparent way for resident taxpayers, the cost of public provision both on property taxation and the other source of revenue (e.g. fees for services or lump sum<sup>3</sup>).

We assume that in the jurisdiction live three types of taxpayers/voters:  $N_1$  Renters (*rent*),  $N_2$  Householders that only own their own house (*own*) and  $N_3$  Householders that own two houses into the jurisdiction - one owner-occupied and the other one tenant-occupied (*own2*), with  $N_1+N_2+N_3=N$ . Each voter occupies only one house, and in each house lives just one voter. This allows us to have a number of houses equal to the number of voters. Without loss of generality, owners of the houses occupied by tenants are all residents in the same jurisdiction.<sup>4</sup> For simplification we also assume that the houses in the jurisdiction are all of identical size and (standardized) value which is fixed to 1. Thus, the jurisdiction's real estate value (base of the property tax) is the price of house ( $p_H=1$ ) for the number of houses, which is equal to the size of the electorate ( $N$ ).

### 3.1 Taxpayer's utility function

Each voter has preferences defined over private and public consumption. Private consumption is financed by the after (national and local) tax exogenous income.<sup>5</sup> Assuming homotheticity and constant elasticity of substitution between private and public goods, the CES utility function of h-agent is:

$$U_h(y, g) = \left[ \alpha_1 (y_h - T_h)^\rho + (1 - \alpha_1) (G_h)^\rho \right]^{1/\rho} \quad (1)$$

in which  $\rho$  is defined by the elasticity of substitution  $\sigma$  as:  $\rho = 1 - 1/\sigma$ ;  $y_h$  is the income after central government taxes of the householders;  $\alpha_1$  is the elasticity of taxpayers' utility for private

<sup>3</sup> To keep the model simple, fees for local public services work as a lump tax in the model presented here.

<sup>4</sup> We considered also more complex structures of ownerships in the jurisdiction, including occupied and non-occupied houses, ownership residents and no residents, homeowners with multiple houses which means a number of houses higher than the number of voters. However, by calibrating the models with reasonable proportions of these variables, we find that it yielded the same qualitative results as in the simpler version of ownership in the text.

<sup>5</sup> Assuming exogenous income is reasonable in a context of local taxation where revenues are collected from property taxes and user service fees.

goods;  $T_h$  and  $G_h$  are the perceived “tax price” and benefit from the local public government. By assuming that residents make decisions based on “perceived” tax prices and benefits we realize that “at the end of the day” the budget constraint will not lie to them; that is, their behavior may not respond to the tax price by substituting away from public goods but the income effect of lower income to buy other goods will be eventually noticed. However, we are assuming in essence that agents make decisions “at the start of the day.” For example, renters vote to increase taxes on property before those taxes are levied.<sup>6</sup> Importantly, our model does not exclude the possibility of “rational” behavior with agents anticipating what will happen “at the end of the day,” but that behavior is found to be a special case in the model. That is, the model does not exclude *a priori* full rationality but we allow deviations from it due to fiscal illusion.

At the cost of lower analytical tractability, we do not make strong assumptions about the elasticity of substitution between private and public consumption. Several past studies in Table 2 indicate that renters overall may obtain larger net-benefits than owners from local public expenditures. Thus, we test if the results qualitatively change assuming: (a) different elasticities of substitution between renters and owners with  $\alpha_1^{rent} \leq \alpha_1^{own}$ ; and (b) two quite different elasticities of substitutions between public and private goods for all residents: in particular assuming  $\sigma = 2$  with a CES utility function and a Cobb-Douglas utility function ( $\sigma \rightarrow 1$ ).<sup>7</sup>

The Cobb-Douglas utility function implies no relationship of complementary or substitution between the public and private goods and this may seem unreasonable. On the other hand, looking at the types of services provided by local governments it is hard to fix a value of  $\sigma$ . Sometimes Municipal public services range from being perfect substitutes (e.g. nursery and primary school, urban public transport) to being perfect complements (e.g. utilities, street maintenance) with private consumption. The model is derived in a symbolic form, so that it may be adapted to both possibilities of substitution  $\sigma \in ]1, \infty]$  or complementarity  $\sigma \in [0, 1[$ . However, we will assume that local public goods provided by municipalities have a more substitute than a complementary nature. Therefore, the default version for the model in the further analytical elaboration has an elasticity a substitution greater than 1 ( $\sigma = 2$ ).

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<sup>6</sup> In the manner of the choice in Figure 1 “Driver’s road map”, the individual has to decide to turn to the left or to the right before arriving at point C or B. Therefore his choice/vote is ex-ante. But shouldn’t the budget constraint avoid the repeated behavior just based on perceptions? Again Figure 1 may explain the repeated behavior based on perception. Moreover, often times the budget constraint is so far off (e.g. at the end of the year) and be hard to discern (for example, because of the complexity of the tax system) that it can be difficult for a “normal” taxpayer to correctly know how much is paid in taxes.

<sup>7</sup> For the sake of space, the analytical solutions for the CES with  $\sigma = 2$  are reported in the appendix.

An important contribution of our model is to weigh up the costs and benefits of public policies for different patterns of cognitive alterations. We indicate with  $T_h$  the “perceived” individual local tax burden and  $G_h$  is the “perceived” provision of local public goods.

As noted above, individual tax burdens depend on the property tax ( $t_p$ ) and fees for public services or lump sum charges ( $t_s$ ). The renter effect implies that tenants do not appropriately perceive the shifting of property taxes onto housing rental rates, thus the property taxes include the parameter  $I \in [0,1]$  to take into account the size of the actual tax-shifting. Thus  $I=0$  means no tax-shifting and  $I=1$  all the tax on property is paid by renters via an increase in their rental payments. The misperception about tax burdens is accounted by the parameter “RE” (Renter Effect), with  $RE=1$  indicating renters who do not associate an increase in rental payments with higher property taxes. To make the interpretation of variables simpler and more homogenous, the parameter for illusion on the revenue side is defined as  $\delta_r = 1-RE$ . Thus  $\delta_r$  ranges from 1 to 0, and a unitary value means that the standard assumption of no cognitive limitation in the taxpayer's perception of tax burden holds.

In general, if we assume that taxpayer's cognitive limitations cause misperceptions of the burden of taxation (revenue illusion), we cannot exclude that he misperceives also the benefits of public expenditure (expenditure illusion,  $\delta_e$ )<sup>8</sup>. Consequently, the renter effect may depend on the net differences between tenant and landlord's perceived property tax burdens and the differences in their perceived benefits associated with the provision of public services. Although this form of misperception can happen, there are not rationales to assume that the degree of misperception in public expenditure changes according to the endowment of real estate. Consequently, we assume a default value of  $\delta_e = 1$  for both types of taxpayers in the following discussion.

Fiscal illusion on the revenue side is much more relevant for renters' decision making than for homeowners. This is due to the underlying assumption that the tenant may wrongly perceive the shifting of property taxes while landlords formally have to pay the property tax. This implies that we can fix  $\delta_r = 1$  for homeowners. To prevent misinterpretation and over parameterization, we omit  $\delta_r$  for homeowners in equation (2).

Summarizing, for each taxpayer, we assume the following form of taxation:

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<sup>8</sup> Puviani (1903) distinguished between pessimistic and optimistic fiscal illusion on the expenditure side. The first one may be accounted with  $\delta_e \in [0,1]$ . It means that citizens perceive the utility of public expenditure lower than real. The optimistic fiscal illusion ( $\delta_e > 1$ ) occurs when public services are perceived by citizens greater than their “real” value.

$$T_h = \begin{cases} \text{rent} & \rightarrow (I\delta_r t_p + t_s)g \\ \text{own} & \rightarrow (t_p + t_s)g \\ \text{own2} & \rightarrow [(2-I)t_p + t_s]g \end{cases} \quad (2)$$

We assume that local public goods yield different utilities depending on the taxpayers' endowments. Two forms of benefits occur in our model: a "consumption effect" - due to higher consumption of public services - and an "endowment or wealth effect" - due to the capitalization of public services into the houses price. This capitalization is accounted for by the parameter  $\lambda$  in expression (3). Equation (3) summarizes the benefits (or costs) of public goods accounted for the individuals' utility functions. In particular, renters experience an increase in utility due to the higher consumption of public goods and the two different types of owners, *own* and *own2*, get benefits both from public consumption and (if  $\lambda > 0$ ) from the capitalization of local services into houses' prices (*own* and *own2*).<sup>9</sup>

$$G_h = \begin{cases} \text{rent} & \rightarrow \delta_e g \\ \text{own} & \rightarrow \delta_e (1 + \lambda)g \\ \text{own2} & \rightarrow \delta_e (1 + 2\lambda)g \end{cases} \quad (3)$$

### 3.2 Taxpayer's demand of Local public goods

Each taxpayer maximizes a utility function according to their house endowment. This implies that we substitute in (1) for the appropriate taxation in (2) and benefits from public services in (3). The optimal demand for the public provision is denote by  $(g_h^*)$  which takes different values for the different types of taxpayers.

Table 1 reports the demands for local goods  $(g_h^*)$  for taxpayers  $h = \text{rent}, \text{own}, \text{own2}$  under the two assumptions of imperfect substitution between the public and private goods, and with a Cobb-Douglas approximation. A consequence of the more general CES form is several solutions of the FOC; in order to generalize the solution, we need to constraint the domain of the variables as reported in Appendix 1.<sup>10</sup> For the elasticity of substitution the solutions are defined for the predetermined values of  $\sigma=1$  and  $\sigma=2$ .

<sup>9</sup> The parameter  $\lambda$  may also take negative values due to an excess public spending resulting in lower housing values (e.g. Martinez-Vazquez and Sjoquist, 1988). However, we derive the model assuming  $\lambda > -1$ , thus, the overall effect (i.e. consumption and wealth) of public spending can be negative in terms of taxpayer's utility only for types "own2."

<sup>10</sup> The results with sigma=2 are calculated by by using "Mathematica 8".

**Table 1:** Taxpayer's demand of public good

<b>Renter</b>	
$g_{rent}^* _{\sigma \rightarrow 1} = \frac{(1 - \alpha_1) y_{rent}}{t_s + I \delta_r t_p}$	
$g_{rent}^* _{\sigma=2} = \frac{\delta_e (\alpha_1 - 1)^2 y_{rent}}{(t_s + I \delta_r t_p) \left[ (\delta_e (\alpha_1 - 1)^2 + (t_s + I \delta_r t_p) \alpha_1^2) \right]}$	
<b>Owner-occupied</b>	
$g_{own}^* _{\sigma \rightarrow 1} = \frac{(1 - \alpha_1) y_{own}}{t_s + t_p}$	
$g_{own}^* _{\sigma=2} = \frac{(1 + \lambda)(\alpha_1 - 1) \delta_e y_{rent}}{\left\{ t_p^2 \alpha_1^2 + t_s \left[ t_s \alpha_1^2 + \delta_e (1 + \lambda - \alpha_1 (1 + \lambda)(2 - \alpha_1)) \right] + t_p \left( 2 t_s \alpha_1^2 + \delta_e (1 + \lambda - \alpha_1 (1 + \lambda)(-2 + \alpha_1)) \right) \right\}}$	
<b>Owner-occupied and owner of tenant-occupied house</b>	
$g_{own2}^* _{\sigma \rightarrow 1} = \frac{(1 - \alpha_1) y_{own2}}{t_s + (2 - I) t_p}$	
$g_{own2}^* _{\sigma=2} = \frac{\delta_e [1 + 2\lambda + \alpha_1 (1 + 2\lambda)(\alpha_1^2 - 2)] y_{own2}}{t_p^2 \alpha_1^2 (2 - I)^2 + t_s \left\{ t_s \alpha_1^2 + \delta_e [1 + \alpha_1 (1 + 2\lambda)(4\lambda + \alpha_1)] \right.}$	
$\left. - t_p^2 \left\{ 2[(I - 2)t_s \alpha_1^2 - 2\lambda + (1 + 2\lambda)(2\alpha_1 - \delta_e)] - I[1 + 2\lambda + (1 + 2\lambda)(\alpha_1^2 - 2)] \right\} \right\}$	

To survey how taxpayer's preferences for public expenditure depend on the exogenous variables and parameters of the model, table 2 summarizes the sign of second derivatives for the renter. It makes plain that higher renters' demand may be due to the mixed effects of misperception of the property tax (i.e. renter's illusion) or differences in the net benefit (i.e. rational behavior).

**Table 2:** Signs of the 2<sup>nd</sup> derivative of the demand of public good

	$g_{\text{ren}}^*$	$g_{\text{own}}^*$	$g_{\text{own2}}^*$
$\partial g_h^* / \partial I$	$\begin{cases} 0 & \delta_r = 0 \\ < 0 & \text{otherwise} \end{cases}$	0	+
$\partial g_h^* / \partial \delta_r$	$\begin{cases} 0 & I = 0 \\ > 0 & \text{otherwise} \end{cases}$	0	0
$\partial g_h^* / \partial t_p$	$\begin{cases} 0 & I = 0 \cup \delta_r = 0 \\ < 0 & \text{otherwise} \end{cases}$	–	–
$\partial g_h^* / \partial \gamma$	+	+	+
$\partial g_h^* / \partial t_s$	–	–	–
$\partial g_h^* / \partial \alpha$	–	–	–
$\partial g_h^* / \partial \delta_e$ (only $\sigma = 2$ )	+	+	+
$\partial g_h^* / \partial \lambda$ (only $\sigma = 2$ )	+	+	+

Notes: For derivatives of  $g_{\text{own2}}^*$  with  $\sigma = 2$ , the results are derived with  $\lambda \in ]-0.5, 2[$  instead of  $\lambda \in ]-1, 2[$ . This was needed to avoid reporting further details on the domains for multiple solutions.

In a *ceteris paribus* approach, the renters' demand is higher than that for owners if  $y_{\text{rent}} > y_{\text{own}, \text{own2}}$ ,  $\alpha_r > \alpha_{\text{own}, \text{own2}}$  and, assuming imperfect substitution of private and public goods, if  $\delta_e^{\text{rent}} > \delta_e^{\text{own}, \text{own2}}$  and  $\lambda_{\text{rent}} > \lambda_{\text{own}, \text{own2}}$ .

Figure 1 compares taxpayers' demands for public goods as a function of the degree of misperception on revenue ( $\delta_r$ ), assuming there is complete tax shifting of the property tax ( $I=1$ ).

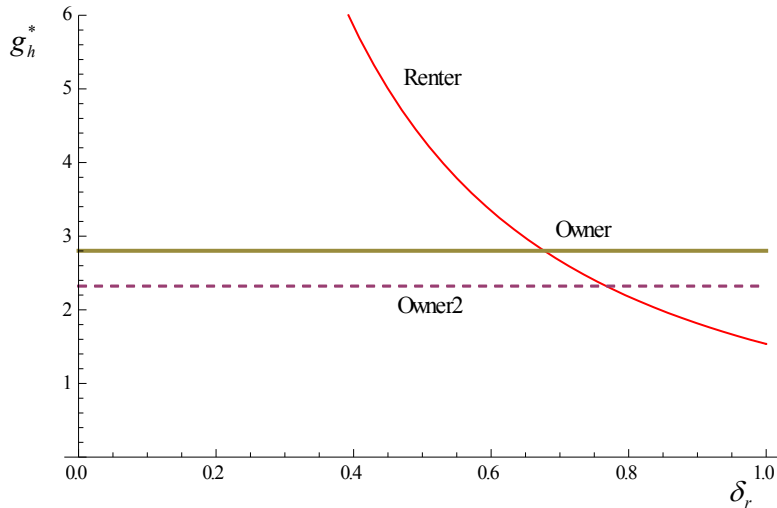
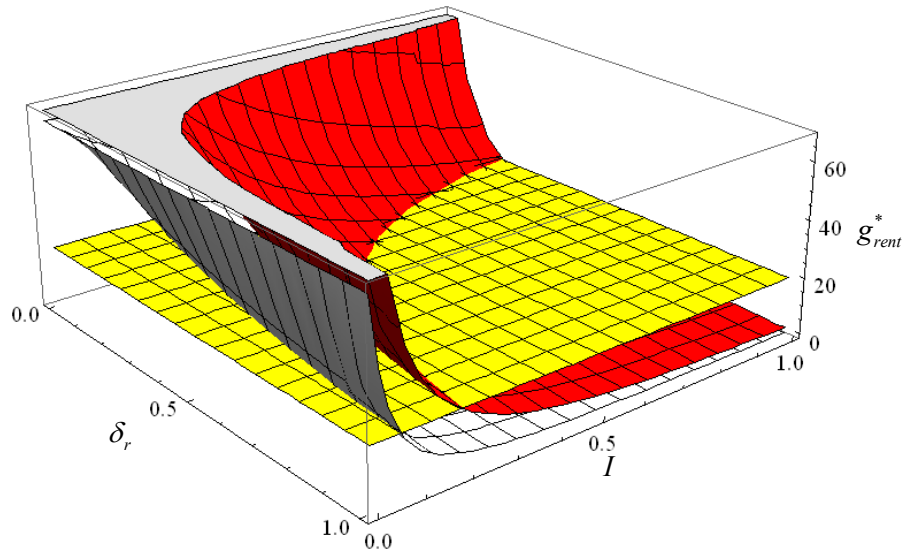
**Figure 1:** Taxpayers' demand for public goods with complete tax shifting



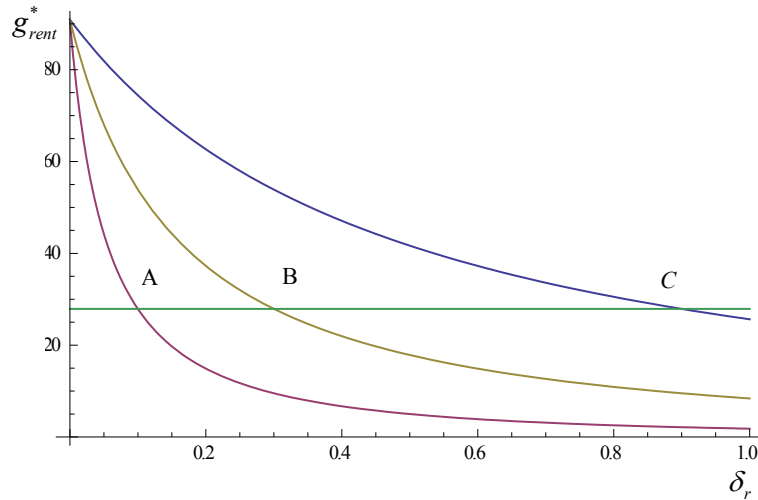
Figure 1 illustrates how taxpayers' preferences for public expenditure depend on the imperfect substitution between the "real tax burden" (measured by tax shifting) and the cognitive limitation of the agent (measured by  $\delta_r$ ). Taking into account this relationship we can now analyze the effects of changes in the other exogenous variables. Figure 2 illustrates what happens as the result of higher income and/or a relatively greater elasticity of the agent's utility from the public good.<sup>11</sup>

**Figure 2:** Renter's Demand of public good



Let us examine just the case of the different levels of tax shifting more closely. Figure 3 shows how conflicting rationales explaining the renter effect may emerge from a dichotomist explanation (rational behavior versus illusion) of this phenomenon. A Pro-illusion argument (solution A): the voter is affected by high renter illusion (RI=0.9,  $\delta_r=0.1$ ) but at the same time he has also a rational expectation about the level of property tax shifting in rental housing ( $I=0.9$ ). An indefinite result (solution B) where renter's illusion and tax-shift coexist (RI=0.3;  $I=0.3$ ). And a pro-rational behavior argument (solution C) where renters perceive (almost) rightly that more public expenditures mean higher tax burdens (low illusion:  $\delta_r=0.9$ ) and they also know that tax shifting into the rental price is minor in size ( $I=0.1$ ).

<sup>11</sup> See the appendix for a description of the values settings for the simulation. Red surfaces estimated with  $y_{rent}^2 = 14$ ;  $\alpha_1^2 = .5$ ; White surfaces is estimated with  $y_{rent}^1 = 10$ ;  $\alpha_1^1 = 0.7$ . The level of public good provision is represented by the (yellow) plane.

**Figure 3:** Different Renters' demands for the public good

From this analysis, we conclude that, although there can be alternative rationales behind renters' preferences for public good provision, they all lead to demand the same quantity of the public good. This makes it rather clearer the challenge of testing via an empirical approach which rational or irrational behaviors actually causes the observed renter effect.

### 3.3 The Local Government: Public Budget

In this section, we provide some discussion on how financial illusion and the shifting of property taxes may affect local fiscal policies. The most significant difference between the micro and macro analysis in our model is that, at an aggregate level, both fiscal illusion and tax shifting are not relevant in terms of the actual budget (i.e.  $\delta_r = \delta_e = 1$  and  $I \in [0, 1]$ ).

Following Holtz-Ezkin (1992), there are two approaches we can follow to analyze the different effects on local government spending and revenue collections. One approach is to build upon the long tradition in public finance using the median voter model. The second approach (e.g. Inman, 1985; Feldstein and Metcalf, 1987) is to explain fiscal policies by assuming that all citizens (and not just the median voter) influence final budget decisions. In this latter approach there is a representative weighted average voter who selects the final policies.<sup>12</sup>

To create a normative benchmark with which to examine the robustness of the local fiscal policies we consider both approaches. These models are calibrated with values derived in the past literature plus our own estimates based on data for OECD countries. The calibrated models are used to get numerical simulations of the renter effect and its effect on the government budget.

<sup>12</sup> See Inman (1987) for an overview of these alternative's views.

Let us assume that the government must satisfy a feasibility constraint with revenues having to cover expenditures.<sup>13</sup> Thus, a straightforward design of local taxation to balance the budget is available. It consists of fixing a flat property tax per-house (i.e. per capita) equals to the fixed cost of public provision ( $t_p = C_F/N$ ) and a public fee equals to the per capita variable cost ( $t_s = C_v/N$ ). Equation (4) shows the budget constraint of the jurisdiction is:

$$\sum_{h=1}^N C(g_h) = g^* \underbrace{\frac{C_F + C_v}{N}}_{\text{average cost}} = g^* N \underbrace{(t^{prop} + t^{serv})}_{\text{tax-price}} = \sum_{h=1}^N T_h \quad (4)$$

### 3.4 The Local Government: The optimal Supply of Local Public goods

We begin by describing what fiscal policy would look like if policies were chosen by a social planner who maximizes an objective social welfare function  $W_{loc,g} = f(u^h)$  with  $h = rent, own, own2$ , subject to the budget constraint in (5). In particular, we use a Benthamite (weighted average of agents' utility) social welfare function, including all the residents of the local jurisdiction. In this case the optimal (social) supply of public (non rival) good is the weighted average of voters' demands:<sup>14</sup>

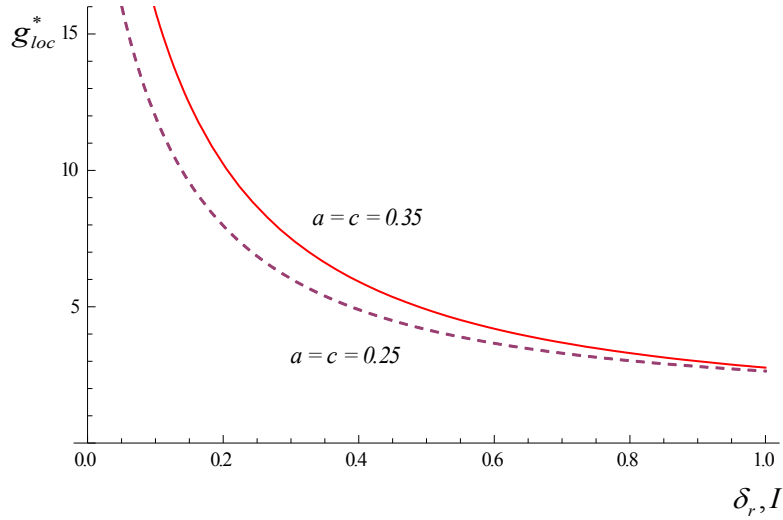
$$\frac{\partial W_{loc}}{\partial g} = g_{loc}^* = ag_{rent}^* + bg_{own}^* + cg_{own2}^* \quad (5)$$

where:  $a = N_1/N$ ;  $b = N_2/N$ ;  $c = N_3/N$ .

From Table 2, it is straightforward to predict the effect of changes in several exogenous variables on the supply of public goods. Undefined effects at the aggregate level emerge only for the tax shifting parameter (I) and the proportion of renters (a). Numerical simulations of equation (5) allow us to evaluate the effects on the provision of the public good (Figure 5). Appendix 1 reports the parameters used for the calibration of the model.

<sup>13</sup> That does not preclude that the national government provides a set of national public goods and also transfers to local unit. However, we will formally ignore these possibilities because they are not relevant for the issue addressed in this paper.

<sup>14</sup> Another possibility would be to consider a Lobbying model were the weights do not explain size but the power to influence the public good provision to one's favor.

**Figure 5:** Public good provision (Benthamite Welfare Function)

According to our simulation output, the model can explain the empirical stylized findings that: (1) in jurisdictions with higher proportions of renters ( $a$ ), there is a higher level of public expenditure; (2) the supply of public goods decreases with increases in tax shifting (with  $\delta_r = 0.5$ ), which correspond with the renter effect explained as “rational” behavior; and (3) the supply of public goods decreases with increases in the misperception about the actual property tax burden (with  $I = 0.5$ ), which corresponds with the renter effect explained as “irrational” behavior.

The model shows that  $\partial W_{loc} / \partial \delta_r < 0$  if  $I > 0$ . In terms of political economy implications, this means that higher levels of misperception increases welfare in the presence of tax shifting. The rationale behind this finding is that while homeowners recognize the reduction of the tax burden as a consequence of the tax shifting, renters - as affected by tax misperception - do not account in their utility function for the higher effective tax burden. Accordingly, in a world of taxpayers with different degrees of misperceptions, the optimal fiscal policy would be to exploit the fiscal illusion phenomena by the social planner. In this case, the aggregate “real” tax burden does not change but the aggregate “perceived” tax burden decreases. This is the first-best solution for fiscal policy in presence of fiscal illusion. This reasoning may be considered an extension of behavioral political economy into public finance. In particular, it may be considered a public policy that follows the libertarian paternalism approach to public choice as proposed by Thaler and Sunstein (2003).

Finally, we run a numerical simulation of the model substituting the optimal social provision (5) in the budget constraint (4) to get the supply of local public goods and size of the public budget as functions of tax misperception.

In the simulation analysis a relevant issue is the calibration of the model's parameters. Lacking data on renter and owners makes it necessary to mix different sources of data. Thus, we set the model with the following default values: From Oates's (2005) we obtain the proportion of renters, and also home owners' incomes. He estimates that about 35 percent of residents are rental occupants. Thus, we fix  $a=c=0.35$  and  $b=0.30$  as default values. For households' gross income Oates (2005) assumes the 1992 the median income of U.S. occupants of rental units is \$ 20,731 and of homeowners, \$ 38,088.

For the taxation parameter we calibrate the model using OECD data (2012). This dataset reports the revenue of "*Recurrent taxes on immovable property*" paid to Local government (code series 4100). Hence, we estimate the average ratio respect to GDP for all the OECD countries between 1990 to 2010 (0.7% of GDP).<sup>15</sup> This rate is applied to the weighted average income of renters and homeowners estimated by Oates (2005), to get the amount of property tax per house ( $t_p = 32,000 \times 0.007 \approx 220$ ).<sup>16</sup>

No comparable data are available for the level of fee for services of public goods provided by municipalities. Considering that user charges (e.g. water, sewerage, refuse collection, market fees, primary school) are traditional sources of local government revenue, based on the rough evidence existing on local budgets, we consider a reasonable approximation to fixing this parameter at 50% of the tax revenues from immovable property ( $t_s = 110$ ). A summary of default values is in appendix A.

Table 3 follows two alternative hypotheses about gross income among local taxpayers. In the first exercise we use the same income for all the citizens. In the second simulation we apply Oates (2005) values for gross income.

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<sup>15</sup> We opt for OECD unweighted average revenue ratio instead of US ratio because the latter is an outlier. US average recurrent taxes on immovable property paid to Local government on the GDP is the highest values among the OECD countries (2.73%) followed by Canada and Israel. For 29 on 34 OECD, the recurrent revenues as percent of GDP from taxes on immovable property is lower than 1.4%. However the main results do not change qualitatively by setting the model with values that fits with US economy:  $t_p = 32,000 \times 0.027 \approx 840$  and  $t_s = 420$ .

<sup>16</sup> It implies that the amount of property tax per each *own* is \$220 and for *own2* is \$440.

**Table 3:** Simulation Output – Benthamite Welfare function

	<b>Parameters</b>	$y_{rent} = y_{own,own2} = 32000$		$y_{rent} = 21000; y_{own,own2} = 38000$	
		$g_{Loc}^*$	<b>Public budget (mln)</b>	$g_{Loc}^*$	<b>Public budget (mln)</b>
1)	$\delta_r = 0$	1.265	4.174	1.015	3.349
2)	$\delta_r = .5$	0.757	2.497	0.681	2.248
3)	$\delta_r = 1$	0.578	1.907	0.564	1.861
4)	$I = \delta_r = .8$	0.591	1.950	0.607	2.005
5)	$I = \delta_r = .2$	1.093	3.606	0.879	2.902

The simulation results reveal that misperception about property taxes leads to increases in local governments' public expenditures. Thus fiscal illusion regarding the property tax explains the empirical findings on the positive correlation between the size of public expenditures and the share of renters in the total population.

### 3.5 The optimal supply of local public goods in a median voter world

This section analyzes the provision of local government service under the assumption that fiscal policy is set by the median voter (Downs, 1957; Black, 1948). As government maximizes the median (*med*) voter's utility, the results with this approach strictly depend on the proportions of individuals aggregated by house endowment and their income distribution. To examine the effect of these variables the analysis is performed in three different scenarios.

Each scenario is structured in four steps: (1) Assuming a jurisdiction of 10,000 voters, we extract (the) gross income of residents according to their status of renters or owners; (2) Fixing the default values for the model, we estimate for each taxpayers' group (*rent*, *own* and *own2*) the optimal demand of the local public good; (3) We aggregate voters to estimate the median value and assume her most preferred quantity to be the one supplied by the local jurisdiction; (4) Substituting  $g_{Loc}^*$  in the government budget constraint we estimate the size of public expenditure.

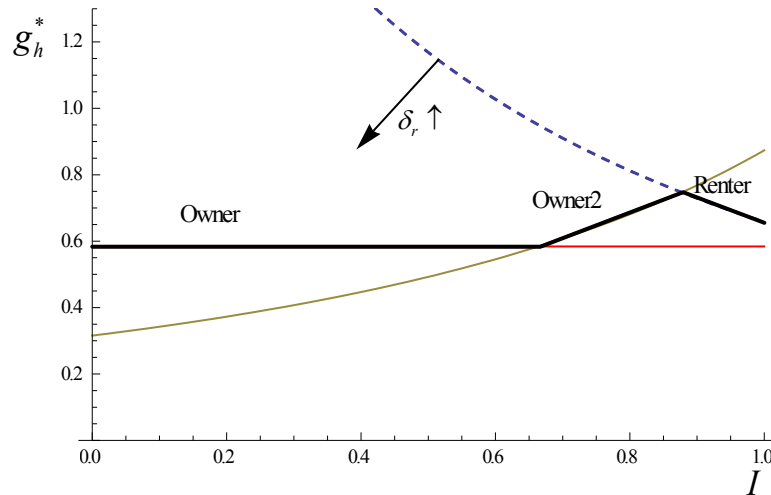
#### Scenario 1:

Assuming no differences in gross incomes between renters and owners, we fix it to the weighted average of U.S. data for 1992 reported by Oates (2005):  $y_{rent} = y_{own} = y_{own2} = 32,000$ . The model is run with the following default values:  $I = 0.5$ ;  $\alpha = 0.5$ ;  $t_p = 220$ ;  $t_s = 110$ ;  $\delta_r = 0.5$ ;  $\delta_e = 1$ ;  $\lambda = 1$ . Table 4 shows the output for the numerical simulations.

**Table 4:** Simulation Output – Equal incomes

	Parameters	$g_{rent}^*$ (3500)	$g_{own}^*$ (3000)	$g_{own2}^*$ (3500)	$g_{Loc}^*$ (median)	Public budget (mln)
1)	$\delta_r = 0$	2.621	0.584	0.493	0.584	1.928
2)	$\delta_r = .5$	1.168	0.584	0.493	0.584	1.928
3)	$\delta_r = 1$	0.658	0.584	0.493	0.584	1.928
4)	$I = \delta_r = .8$	0.507	0.584	0.681	0.584	1.928
5)	$I = \delta_r = .2$	21.875	0.584	0.373	0.584	1.928

From Table 4, we point out that while the misperception of property tax burden increases renter's preference for public expenditure, this may be not relevant to determine the optimal supply of local public services. The final result depends on the size of tax shifting parameter ( $I$ ), fiscal illusion regarding the property tax ( $\delta_r$ ), and the proportions of renters and owners ( $a$ ,  $b$  and  $c$ ). Figure 6 shows graphically how the renter effect may actually modify the local provision of public goods according to the level of tax shifting and with  $\delta_r = 0.5$ . The bold black line indicates the median's preference for the public good.

**Figure 6.** Median Voter's demand of public good Vs Tax shifting (Equal income)

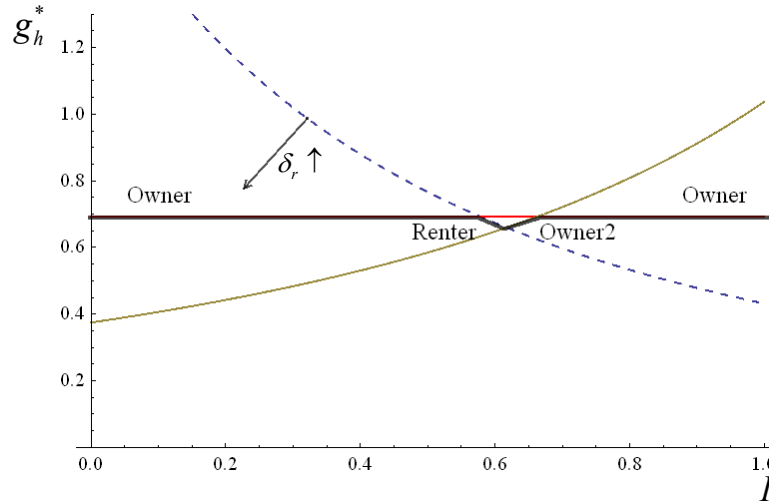
### Scenario 2:

Here we assume different gross incomes for renters and owners with  $y_{rent} = 21,000$  and  $y_{own,own2} = 38,000$ , and we use the same default values as in the previous simulation.

**Table 5:** Simulation Output – different incomes between groups

	Parameters	$g_{rent}^*$ (3500)	$g_{own}^*$ (3000)	$g_{own2}^*$ (3500)	$g_{Loc}^*$ (median)	Public budget (mln)
1)	$\delta_r = 0$	1.720	0.694	0.585	0.694	2.289
2)	$\delta_r = .5$	0.767	0.694	0.585	0.694	2.289
3)	$\delta_r = 1$	0.432	0.694	0.585	0.585	1.930
4)	$I = \delta_r = .8$	0.333	0.694	0.809	0.694	2.289
5)	$I = \delta_r = .2$	1.476	0.694	0.443	0.694	2.289

As for the first scenario in this simulation the renter effect may also have consequences for the local public budget. Figure 7 shows the median taxpayer's preference for the public good (bold black line) with  $\delta_r = 0.5$ .

**Figure 7.** Median Voter's demand of public goods Vs tax shifting (different incomes)

### Scenario 3:

In this scenario, we assume differences between and within renters and owners' gross incomes. Following the literature on income distribution, we assume a lognormal distribution of income within each of three groups of taxpayers. As the median of the lognormal distribution is  $e^\mu$ , we derive the location parameter ( $\mu$ ) from Oates's (2005). To the best of our knowledge, distinct estimates of the scale parameter ( $\sigma$ ) for renters and owners' income distributions are not available. Thus, we assume that each group of households has the same standard deviation ( $\sigma_h = \sigma$ ). In particular, Campano and Salvatore (2006) estimate a value of  $\sigma$  for the lognormal



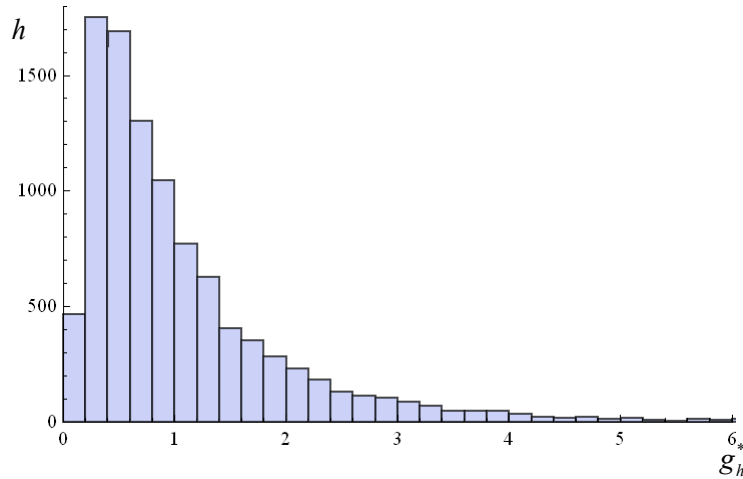
distribution of income in USA equal to 0.65.<sup>17</sup> Therefore  $y_{rent} \in (0.95, 0.65)$  and  $y_{own, own2} \in (0.55, 0.65)$ .

**Table 6:** Simulation Output – different income between and within groups

	Parameters	$g_{rent}^*$ (3500)	$g_{own}^*$ (3000)	$g_{own2}^*$ (3500)	$g_{Loc}^*$ (median)	Public budget (mln)
1)	$\delta_r = 0$	1.690	0.685	0.579	0.871	2.873
2)	$\delta_r = .5$	0.753	0.685	0.579	0.671	2.213
3)	$\delta_r = 1$	0.424	0.685	0.579	0.549	1.813
4)	$I = \delta_r = .8$	0.327	0.685	0.801	0.567	1.872
5)	$I = \delta_r = .2$	1.450	0.685	0.438	0.755	2.492

The simulation outputs in table 6 show that the under-perception of tax burden increases the median voter's preference for public expenditure. Thus, fiscal illusion regarding the property tax explains the empirical findings of a correlation between public expenditure size and the percent renters. Figure 8 shows the distribution of the demands for public goods in the jurisdiction.

**Figure 8:** Overall demand of Local Public Provision ( $I = 0.5; \delta_r = 0.5$ )



The simulations in the three scenarios show that if  $\alpha_1^{rent} < \alpha_1^{own}$  (i.e. if renters' overall elasticity for public goods is higher than that for homeowners) the renter effect is stronger. In this sense we find support for the hypothesis that beyond misperception issues, the different preferences for public services goods between two groups of households may also explain the renter effect.

<sup>17</sup> They extract a dataset from the U.S. Census Bureau report, Money Income in the United States, 1999.

Conclusively, these simulations show that when government maximizes the median (*med*) voter's utility in a (realistic) context where (a) the proportion of renters is lower than homeowners and (b) the gross income between (scenario 2) and within (scenario 3) these groups is different, thus the median voter is usually a homeowner. As a result the issue of whether the renter effect is an irrational or rational behavior is not relevant to explain the optimal supply of the public good of the jurisdiction.

Overall then, from an optimal supply of public goods approach, the renter effect may or may not be relevant and when it is relevant we are not able to distinguish between the rational or irrational behavior of renters which is supposed to be behind their observed preferences for public goods.

#### **4. Conclusion**

In this paper we propose a theoretical framework to examine the nature and potential impacts of what is known as the “renter effect”. The theoretical framework takes into account cognitive issues and “pure” economic factors both of which may be behind the observed renters' preferences on the larger size of local public provision. From a theoretical point of view we extend the analysis of local public finance to shed light on the relevance of fiscal illusion for the size of the local public sector. In this sense our aim is to include in local public finance the perspective of behavioral economics and interpret some of our results as part of behavioral local public finance.

The paper contributes to the existing literature in two ways. First, we introduce “cognitive limitation” to an issue of local public finance which has been a source of controversy for a long time. Second, we fill a gap in the literature about a lack of micro-foundations concerning the renter's illusion hypothesis.

Assuming that taxpayers may be affected by misperception regarding the shifting of property taxes we focus on three sources of agent heterogeneity with reference of ownership status, preferences for public and private goods, and gross income. By taking this approach we aim to overcome the dichotomy between rational and irrational taxpayer's behavior to explain the renter effect as a function of the level of misperception.

The theoretical model is simulated for given model parameters based on OECD economies. The macroeconomic results depend on the approach taken to define optimal public good provision. Using a Benthamite (weighted average of agents' utility) social welfare function, we find that misperception of the property tax leads to increases in local governments public expenditures. Thus fiscal illusion regarding property taxes can explain the empirical evidence regarding the

correlation between the size of public expenditures and the proportion of renters. A second simulation exercise is based on the median voter model and our simulation results show that the median voter is usually a homeowner, and that therefore in this case the rational or irrational renter's vote is not relevant to explain the observed renter effect.

## References

- Banzhaf H. Spencer, Oates W. E. (2012) On fiscal illusion and Ricardian equivalence in local public finance, NBER Working Paper No. 18040.
- Black, D. (1948) On the Rationale of Group Decision-making, *Journal of Political Economy* 56: 23-34.
- Bogart W.T., (1991) Observable heterogeneity and the demand for local public spending, *National Tax Journal* 44: 213–224.
- Buchanan J.M. (1967). *The fiscal illusion. Public finance in democratic process: fiscal institutions and individual choice*, University of North Carolina press, Chapel Hill (USA).
- Campano F., Salvatore D. (2006), *Income distribution*. Oxford University Press. New York.
- Carroll R.J., Yinger J., (1994). Is the property tax a benefit tax? The case of rental housing, *National Tax Journal* 47: 295–316.
- Dell'Anno R., De Rosa V.M. (2013). The relevance of the theory of Fiscal Illusion. The case of the Italian tax system. *History of Economic Thought and Policy*, (forthcoming).
- Dell'Anno R., Mourao P. (2012). Fiscal Illusion around the World. An analysis using the Structural Equation Approach. *Public Finance Review*, 40(2): 270-299.
- Deno K.T., Mahey S.L., (1987). Municipal management structure and fiscal performance: do city managers make a difference? *Southern Economic Journal* 53: 627–642.
- Downs, A. (1957) *An Economic Theory of Democracy*. New York: Harper Collins.
- Blom-Hansen J. (2005). Renter Illusion: Fact or Fiction? *Urban Studies*, 42: 127–140.
- Eppl D., Romer T. (1991). Mobility and Redistribution. *Journal of Political Economy* 99: 828-58.
- Feldstein M.S., Metcalf G.E. (1987). The Effect of Federal Tax Deductibility on State and Local Taxes and Spending. *Journal of Political Economy*, 95, 4: 710-36.
- Gonzalez R.A., Means T.S., Mehay S.L., (1993). Empirical tests of the Samuelsonian publicness parameter: has the right hypothesis been tested? *Public Choice* 77:523–534.
- Gronberg T.J., (1979). The interaction of markets in housing and local public goods, *Southern Economic Journal* 46: 445–459.
- Holtz-Eakin, Di, (1992). Elections and Aggregation: Interpreting Econometric Analyses of Local Governments, *Public Choice*, 74, 1: 17-42.
- Inman, R.P., (1985). Does Deductibility Influence Local Taxation? NBER Working Paper No. w1714.

- Inman, R. P., (1987). Markets, governments, and the "new" political economy, *Handbook of Public Economics*, in: A. J. Auerbach and M. Feldstein (ed.), *Handbook of Public Economics*, edition 1, volume 2: 647-777. Elsevier.
- Levy, M. D. (1979). A comparison of voting behaviour on tax initiatives with different perceived distribution consequences. *National Tax Journal* (December): 303-307.
- Lovell M.C., (1978), Spending for education: the exercise of public choice, *Review of Economics and Statistics* 60: 487–495.
- Luckiesh M.(1922). *Visual Illusions: Their Causes, Characteristics, and Applications*. Van Nostran Company, New York.
- Martinez-Vazquez J., (1983). Renters' illusion or savvy? *Public Finance Quarterly*, 11: 237–247.
- Martinez-Vazquez J., Sjoquist D.L., (1988). Property tax financing, renting, and the level of local expenditure, *Southern Economic Journal*, 55: 424–431.
- Megna R.H., Lee T.H., (1990) Estimation of the demand for local public education under a kinked budget constraint, *Review of Economic and Statistics* 72: 596–602.
- McFadden D., (1999). Rationality for Economists?, *Journal of Risk and Uncertainty*, 19(1-3), 73-105.
- Oates, W. E. (1988). On the nature and measurement of fiscal illusion: a survey, in: G. BRENNAN ET AL. (Eds) *Taxation and Fiscal Federalism: Essays in Honour of Russell Mathews*, pp. 65–82. Sydney: Australian National University Press [Reprinted in W. E. Oates (1991) *Studies in Fiscal Federalism*, pp. 431–448. Worcester: Edward Elgar].
- Oates, W. E. (2005). Property taxation and local public spending: the renter effect. *Journal of Urban Economics* 57: 419–431.
- OECD (2012). *OECD Revenue Statistics - Comparative Series dataset*. Available at <http://stats.oecd.org/Index.aspx?DataSetCode=REV>.
- Puviani A. [1903] (1973) *Teoria della illusione finanziaria*, Palermo, Sandron (reprinted: Milano, ISEDI, 1973, with an introduction by F. Volpi).
- Roche E.P. (1985). *Property taxation in local finance: differences in the tax price between renters and owner-occupant*, PhD dissertation, Unpublished, University of Maryland, 1986.
- Samuelson, P. A. (1954). The Theory of Public Expenditure, *Review of Economics and Statistics* 36: 386–389.
- Santerre R.E., (1989) Representative versus direct democracy: are there any expenditure differences? *Public Choice* 60: 145–154.
- Winter, S., Mouritzen, P. E. (2001) Why people want something for nothing: the role of asymmetric illusions, *European Journal of Political Research*, 39: 109–143.
- Zodrow, G. (2001). The Property Tax as a Capital Tax: A Room with three Views, *National Tax Journal*, 54(1): 139-156.
- Zodrow, G.( 2006). Who Pays the Property Tax? *Land Lines* 18(2), April.

### Appendix 1

#### Variables Domains –Default Values for Numerical simulations

Model Variables	Domain of variables	Default Values for Simulations
Non rival Public Good	$g > 0$	
Elasticity of substitution	$\sigma \geq 1$	$\sigma = 2$
Taxpayers Gross Income	$y > t_s$	a) $y = 10$ <u>For median voter analysis:</u> b) 1°scenario $y_h = 32,000$ . c) 2° scenario $y_{rent} = 21000$ ; $y_{own,own2} = 38000$ . d) 3° scenario $y_{rent} \in [0.95, 0.65]$ ; $y_{own,own2} \in [0.55, 0.65]$
Tax shifting	$I \in [0,1]$	$I = 0.5$
Renter illusion	$\delta_r \in [0,1]$	$\delta^{rev} = 0.5$
Tax property (per-house)	$t_p > 0$	a) $t^{prop} = C_F / N = 2$ b) For median voter: $t^{prop} = 220$
Fee for public services	$t_s > 0$	a) $t^{serv} = C_V / N = 0.1$ b) For median voter: $t^{serv} = 110$
Illusion on expenditure	$\delta_e \in ]0,1]$	$\delta_e = 1$
Elasticity Private consumption	$\alpha_1 \in ]0,1[$	$\alpha_1 = 0.5$
Elasticity Public consumption	$1 - \alpha_1$	$1 - \alpha_1 = 0.5$
Tax Capitalization in houses price	$\lambda \in ]-1,2]$	$\lambda = 1$
Percentage of <i>rent</i>	$a \in [0,1]$	$a = N_1 / N = 0.35$ ; for median voter: $N=10,000$
Percentage of <i>own</i>	$b \in [0,1]$	$b = N_2 / N = 0.30$ ; for median voter: $N=10,000$
Percentage of <i>own2</i>	$c \in [0,1]$	$c = N_3 / N = 0.35$ ; for median voter: $N=10,000$